

**PREPARATION AND
CHARACTERIZATION OF SPUTTER
DEPOSITED LiCoO_2 THIN FILMS FOR
THIN FILM BATTERIES**

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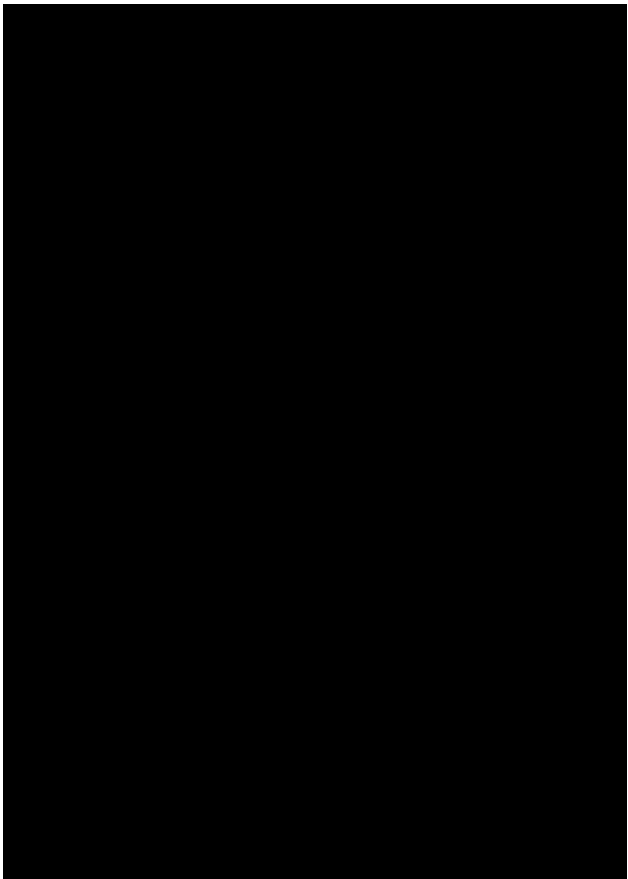
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Abstract:

Presently micro-and meso-machines (MEMS) are powered by sources that are large in comparison to the actual MEMS device size. Development of small-scale power sources is critical if these devices are to reach their full usefulness. A prototype thin film bipolar battery utilizing a LiCoO_2 cathode prepared by rf sputtering is presently under development by us to meet this need. While the use of sputter deposition of LiCoO_2 thin films is established [1-3], little work has been done to fully characterize the electronic structural characteristics of the film. Further, since the Li-ion mobility is highly directional in the oxide lattice, our effort has been focused on preparation of oriented oxide cathodes, with the (101) or (104) plane of atoms parallel to the substrate.

After preparation, the samples are fully characterized using x-ray diffraction and x-ray absorption spectroscopy (XAS). By these studies we have determined that oriented samples can be prepared. An interesting feature of the x-ray absorption near edge structure (XANES) is it's anisotropic characteristic. For these studies the thin film sample was placed into the experimental holder in a variety of orientations with respect to the incident beam, and the spectra recorded. Depending on the relative orientations of the sample and incident beam, variable results were obtained, i.e. the spectra obtained from the horizontal setup is quite different from that obtained from a vertical arrangement. This is illustrated by the data shown in Figure 1. This characteristic may in fact indicate some interesting electrical characteristics of the material.



We will describe the method of preparation, as well as provide information regarding the structural characteristics of the resultant film.

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XAS studies were performed at the X-11A beamline at Brookhaven National Laboratory.

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